Generative artificial intelligence

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Abstract

Recent developments in the field of artificial intelligence (AI) have enabled new paradigms of machine processing, shifting from data-driven, discriminative AI tasks toward sophisticated, creative tasks through generative AI. Leveraging deep generative models, generative AI is capable of producing novel and realistic content across a broad spectrum (e.g., texts, images, or programming code) for various domains based on basic user prompts. In this article, we offer a comprehensive overview of the fundamentals of generative AI with its underpinning concepts and prospects. We provide a conceptual introduction to relevant terms and techniques, outline the inherent properties that constitute generative AI, and elaborate on the potentials and challenges. We underline the necessity for researchers and practitioners to comprehend the distinctive characteristics of generative artificial intelligence in order to harness its potential while mitigating its risks and to contribute to a principal understanding.